Pellagra and the origin of a myth: evidence from European literature and folklore

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Although medical publications contain examples of clinical vampirism¹, blood-drinking tyrants are an unlikely basis for the European vampire folklore. Such individuals, although noted in history, were rarely encountered. More likely, the vampire legend developed out of communities' mounting fear of a disease they encountered daily. Because their understanding of medicine included aspects of magic, eighteenth and nineteenth century villagers used their belief in fables, such as vampires, to explain the unknown. Although various diseases ravaged parts of Europe during this period, a discongruity exists between the causes of the diseases and villagers' explanations for them; frequently a lingering disease was seen as having a supernatural cause, with the first victim labelled as a vampire². Notably, the vampire belief has always been a theory of contagion; the term nosferatu, popularized by Bram Stoker's Dracula3, is an archaic term derived from the Greek nosophorus, which means 'plague carrier'4.

Several diseases, including rabies⁵ and tuberculosis⁶, have been linked to the genesis of vampire folklore. In particular, the speculated relationship between erythropoietic porphyria⁷ and vampirism has received a great deal of media attention—much to the displeasure of porphyrians worldwide⁸. None of these diseases satisfactorily presents clinical signs that would have been necessary to instigate the widespread European folkloric vampire belief. Although our interest is not to 'medicalize a myth'⁸, pellagra, a dietary deficiency of niacin and tryptophan, makes intriguing arguments for being the originator of the vampire myth. First recognized in 1735, pellagra was the scourge of Europe and then the United States for two centuries⁹. Pellagra is still seen occasionally in scattered populations of southern Africa, Egypt, and India^{10,11}.

After American corn (maize) was introduced to Europe, the food calories yielded per acre increased greatly over what had been provided previously by rye and wheat¹². The use of corn as a staple crop spread gradually from the Iberian Peninsula to eastern Europe⁹. At that time, where corn went pellagra was sure to follow, for cornmeal became

the main source of energy for poor people. Although popularly observed and described in Spain and Italy, pellagra was uniquely macabre in eastern Europe, where poverty, cultural viewpoints, and a lack of medical knowledge kept the disease from being diagnosed until 18589. For years, an infectious or genetic cause was suspected, but pellagra is generally the consequence of a diet which relies upon corn as a staple because the niacin and tryptophan in corn are bound and have poor bioavailability. Clinically, the disease is identified by the 'four Ds'—dermatitis, dementia, diarrhoea, and death.

Like all folklore, the legend of the vampire has evolved throughout the centuries. Our current vampire image has its origin in the folklore and writings of eastern European countries beginning in the early $1700s^{2,4}$. The novel *Dracula* is often considered a handbook of vampire characteristics, for its author did extensive folklore research before writing his masterpiece. Published in 1897, Stoker's work is renowned for masterfully combining all of the European folkloric beliefs into one persona. Because *Dracula* will be familiar to many readers, we take references from this classic as well as from European folklore to argue that European pellagra epidemics were responsible for the vampire belief.

DERMATITIS

The dermatological consequences of pellagra persuasively suggest a relationship with vampire folklore. Just as vampires must avoid sunlight to maintain their strength and keep from decay, pellagrins are hypersensitive to sunlight, with the margins of their dermatitis sharply demarcated. Sun-exposed areas at first become red and thick with hyperkeratosis and scaling. This is followed by inflammation and oedema, which eventually leads to depigmented, shiny skin alternating with rough, brown, scaly areas. With repeated episodes of erythema, a pellagrin's skin becomes paper-thin and assumes a parchment-like texture¹³. Early in Dracula, Stoker characterizes the Count—who had avoided sunlight and went out only at night—as a man of 'extraordinary pallor' without 'a speck of colour about him', yet he had a 'bloated face'3. Meanwhile, Dracula describes himself as 'a blot on the face of God's sunshine' and notes to his guest Jonathan Harker: 'I love the shade and the shadow'.

¹Division of Preventive and Behavioral Medicine, Department of Medicine, University of Massachusetts Medical School, 55 Lake Avenue North, Worcester, MA 01655; ²English Department, Independence Hall, Upper College Road, University of Rhode Island, Kingston, RI 02881, USA In addition, pellagrins are said to have a 'foul mouth'⁴. (In fact, the association between vampire folklore and garlic may have developed from villagers' practice of homoeopathic medicine²; that is, they intended to 'fight fire with fire'.) This pungency of breath is perhaps best exemplified by canine black-tongue¹⁵, the animal model of pellagra. Dogs that lack niacin in their diet develop a version of pellagra characterized by bleeding sores in the mouth. The blood which does not run from their mouths becomes dried and crusts on their tongues—hence the term black-tongue.

In humans, the tongue of a pellagrin is marked by glossitis and excessive redness, causing an intuitive association with blood. Because of tongue oedema, tooth imprints are often left on the tongue, suggesting to an observer that a pellagrin has protuberant teeth or fangs. Similarly, pellagrins develop an inflammation of the lips which become red and cracked¹³, reflective of Stoker's description of Dracula's lips which showed 'remarkable ruddiness' and 'the ruddy colour, the voluptuous lips' of the three vampire brides³.

DEMENTIA

Because niacin is not available for metabolic processes, neurons in the brain degenerate with development of dementia. Clinical symptoms—including insomnia, anxiety, unjustified aggression, and depression—are of the manic-depressive type and can be severe enough to demand admission to a psychiatric hospital 14,16. These symptoms are characteristic of the folkloric vampire who does not sleep at night and is morose or irritable. Perhaps because of the unpredictable behaviour of pellagrins, villagers grew to fear the possibility of a violent attack during the night. In Dracula, Dr Seward comments on his patient R N Renfield, who is not a vampire in the novel but worships the Count and engages in repulsive behaviours, hoping to impress Dracula: 'sanguine temperament; morbidly excitable; periods of gloom . . . a possibly dangerous man'. Later, Seward notes that Renfield is 'an undeveloped homicidal maniac' who would '[sit] in a corner brooding'.

An often overlooked aspect of pellagra is that pica may occur concurrently¹⁷, perhaps as a desperate attempt to include niacin in the diet. Pica is a pathological craving for normal foods or for substances not usually regarded as foods. Most often, consumption of ice and clay are reported although more bizarre substances have been noted. With echoes of early burial and entombment procedures, pellagrins tend to crave vinegar and spices¹⁴. And in *Dracula* Dr Seward describes Renfield as being zoophagous (i.e. life eating) because he eats flies, spiders, and sparrows. Although Renfield is maniacal, his obsessive craving could be considered an extreme case of pica.

DIARRHOEA

Diarrhoea has never been discussed as an aspect of the vampire myth; however, one would expect limited references from nineteenth century sources regarding bodily functions such as excretion. According to legend, vampires do not consume food, for they need only blood to survive. In reality, anorexia, weight loss, and refusal of food are common among pellagrins because of the mucous membrane lesions, particularly in the oesophagus, stomach, and colon^{13–14}. In *Dracula*, the Count continually apologizes for not dining with his guest Harker: 'You will, I trust, excuse me that I do not join you; but I have dined already, and I do not sup'3. Later in the novel, Mina Harker describes: 'I could not eat; to even try to do so was repulsive to me'. In addition to dysphagia, circumstances such as poverty, poor hygiene, and inadequate cooking methods were probably common among pellagrins, further worsening their disease state. These factors also promote the risk for parasitic infections, reflective of the vampire's legendary association with vermin.

DEATH

Historically, allegations of vampirism were from communities that had a great number of people dying from a chronic disease⁴. Vampires were seen as the malefactors of the inexplicable, even though folkloric vampires were never caught in an attack². Instead, the main reason for identifying a person as a vampire was a wasting disease. Vampire folklore holds that those who die leave behind relatives and friends with whom they have unfinished agendas: strong emotional connections cause the recently deceased to leave their graves and seek vengeance against family members and neighbours who mistreated them during life. If pellagra had been the culprit as the cause of death, then the deceased's relatives and neighbours would probably have had similar diets; as a consequence, their own development of pellagra would have been interpreted as the dead returning for revenge.

A disparity between the folkloric vampire and the contemporary vampire image is the fate of the vampire's victims. In general, a single attack by the folkloric vampire was not fatal. Instead, vampires were seen as absorbing the vitality of family members and neighbours over a long period by repeated assaults. A progressive disease, untreated pellagra typically leads to death in four to five years; nevertheless, death from pellagra may come suddenly, even when clinical symptoms appear to be mild¹³.

Blood is crucial for life, and a pellagrin who became anaemic because of gastrointestinal bleeding may have given the impression of being 'the living dead'. The association between blood loss and ensuing death is portrayed by Renfield who, after 'licking up like a dog' the blood which fell from Harker's wounded wrist, proclaims: 'The blood is the life! the blood is the life'!

FURTHER EVIDENCE

Additional reasons from *Dracula* and folklore connect pellagra with the vampire belief. For example, according to the *Oxford English Dictionary* the word vampire first entered English in 1734, the year before pellagra was noted by a royal physician as a 'disgusting indigenous disease' among Spanish peasants^{2,18}. And before reaching Castle Dracula, Harker consumes a breakfast including 'a sort of porridge of maize flour which she said was 'mamaligia''. Besides water, mamaligia has cornmeal as its primary ingredient. If this meal was consumed as a staple by impoverished eastern Europeans, pellagra would not be an unexpected consequence.

Also, reports of European folklore have shown that seeds were used as a protective measure against vampires. The legendary motive for using seeds was that vampires would be inclined to count them and would therefore neglect to find new victims. In particular, seeds of millet were popular^{2,4}. Of all seeds, it is ironic that millet would be chosen as an apotropaic because it has an excess of leucine. A dietary excess of this aminoacid blocks the conversion of tryptophan to niacin¹⁰ and would thus worsen the pellagric state.

Often referred to as 'the springtime disease' 12, pellagra increased in the spring when the new crops were not yet ready and cornmeal was a large part of the diet. According to tradition, St George's Day, in late April or early May, was the day on which vampires would gather at the edge of a village to plan their wicked activities for the next year. To complement the association of spring with the vampire myth, Jonathan Harker is told upon his arrival in Transylvania: 'It is the eve of St. George's Day. Do you not know that to-night, when the clock strikes midnight, all the evil things in the world will have full sway?' 3

CONCLUSIONS

As Mary Shelley writes in her foreword to *Frankenstein*: 'Everything must have a beginning, to speak in Sanchean phrase, and that beginning must be linked to something that went before'¹⁹. Was pellagra responsible for instigating the vampire myth? For now, that can be only a matter of conjecture. Although one could argue that an inadequate intake of several essential nutrients could cause symptoms such as glossititis, anaemia, anorexia, and pica, considerable historical evidence indicates that pellagra was more widespread than any of the other diseases caused by deficiencies of water-soluble vitamins²⁰.

Because all legends change with time, one cannot reconcile all aspects of the vampire myth with the evidence from pellagra. For example, pellagra does not account for the use of the Crucifix, the Eucharist wafer, or holy water, which have long been cited as protective against vampires (even though folkloric vampires never reacted violently to the Cross²). These aspects of the myth may have been developed by clergy members and villagers who assumed that those who became ill and died were heretics receiving punishment for their sins. Furthermore, the pious reasoned that very sinful people, such as alcoholics (who probably had a poor diet), were most likely to be vampires and would return from the dead².

Even though the practice was forbidden by the Church, hysterical communities did disinter graves to examine bodies for evidence of vampirism; not surprisingly, almost all exhumations yielded a perceived vampire. Most frequently, a reputed vampire's face would be recorded as being red and marked with fresh blood^{2,4}. Intriguingly, the second tell-tale sign of vampirism was a ring of cornmeal around the mouth of the deceased⁴. As odd as this association with vampirism is, perhaps eighteenth and nineteenth century villagers had a better understanding of nutrition and epidemiology than we now give them credit for.

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